

## TECHNICAL MEMORANDUM

EPA Region 5 Records Ctr.



313811

---

**Date:** May 14, 2007

**To:** Henry Nehls-Lowe  
Bureau of Environmental and Occupational Health  
Wisconsin Dept of Health & Family Services

**From:** Pei-Fung Hurst, URS Corporation

**Subject:** Comments on Human Health Risk Assessment  
Ashland/Northern States Power Lakefront Superfund Site  
Ashland, Wisconsin

---

This memorandum provides responses to review comments provided Mr. Henry Nehls-Lowe of Bureau of Environmental and Occupational Health, Wisconsin Department of Health & Family Services (WDHFS) on the revised draft human health risk assessment (HHRA) prepared as one of the Associated Documents with the revised draft Remedial Investigation (RI) Report for the subject site submitted to USEPA on January 25, 2007.

Mr. Nehls-Lowe's primary comments on the HHRA, discussed during a conference call with NSPW on April 19, 2007, are:

1. Trespasser scenario with regard to the POTW (exposure to VOCs from groundwater seepage).
2. Utility worker exposure via dermal contact with "oily water" at Kreher Park (and coupled with it the exposure of oily water in "slicks" in the bay observed in surface water).
3. Discussing the results of the 1998 SEH HHRA as part of the HHRA text.

This memorandum focuses on the first two comments. Response to the third comment will be provided in the revised HHRA report after formal Agency comments are received.

### **1.0 Exposure to VOCs from Groundwater Seepage at the POTW**

In 2002, a consultant for the City of Ashland inspected the inside of the POTW building and collected a single round of indoor air samples. Samples were only analyzed for limited chemicals (selected PAHs, trimethylbenzene and acetic acid). The results of this sampling indicated that Site-related compounds are probably in the indoor air of the former POTW building, and a thorough indoor air investigation was recommended before final re-use decisions (WDHFS, 2003)

## TECHNICAL MEMORANDUM

The approved RI Work Plan (URS, February 2005) described that the trespasser scenario to the existing WWTP would be evaluated. Groundwater seepage into the WWTP containing COPCs could result in the exposure pathways of incidental ingestion, inhalation and dermal contact. However, no water or indoor air samples were collected from the building during the RI sampling program because of access restrictions. Consequently a quantitative evaluation for the potential trespasser exposures to the indoor air and water inside the POTW building was not performed.

The potential for exposure to VOCs inside the POTW building is considered low because the building is locked and the perimeter is fenced with posted warning signs. If, however, it is deemed necessary to quantitatively evaluate trespasser exposure to VOCs in indoor air from groundwater seepage inside the building, indoor air samples should be collected for laboratory analyses for site-related VOCs to support the development of a quantitative evaluation. In addition, water samples should be collected from inside the building for analyses to support the evaluation of health risks potentially associated with the incidental ingestion and dermal pathways.

### **2.0 Exposure to “Oily Water”**

Potential risks posed by oily materials in groundwater were evaluated using the following approach:

#### **Exposure Pathways**

- Construction workers may be exposed to oily materials in groundwater via dermal contact when performing excavation activities below water table; and
- Swimmers or waders may be exposed to oil slicks in surface water via ingestion and dermal contact while swimming or wading in the bay.

#### **Concentration Terms**

Oily materials in groundwater or slicks in surface water were not sampled during the RI. For the purpose of this evaluation, concentrations of chemicals in “oily water” were based on the following:

- Laboratory analytical data of the dense non-aqueous phase liquid (DNAPL) samples collected from the product stream recovered from the active free product recovery system for the Copper Falls aquifer (Presented in Appendix D6 of the draft RI report).
- Chemical-specific solubility values of chemicals detected in the DNAPL sample.

## TECHNICAL MEMORANDUM

### **Dermal Absorption of Oily Materials**

Equations necessary for quantifying intake of chemicals in oily materials following dermal contact have not been established by the USEPA. In this evaluation, risks potentially associated with dermal exposure to oily materials were quantified using methodology for dermal exposure to aqueous medium, as provided in RAGS, Part E (USEPA, 2004)

A summary of estimated cancer risk (CR) and noncancer risk (expressed as a Hazard Index (HI)) for oily materials is presented in **Table 1** (using concentrations detected in the DNAPL sample) and **Table 2** (using solubility). Detailed information regarding the calculation of risk levels is presented in **Attachments A and B**, as indicated on **Tables 1 and 2**.

High CR and HI values presented on **Tables 1 and 2** suggest that adverse health effects can result from exposure to oily material. However, it should be emphasized that there is a high degree of uncertainty associated with these risk estimates due to the conservative approach used in the evaluation.

Presented below is a brief summary of areas of uncertainty related to the risks estimated for exposure to oily material in groundwater or surface water.

- Lack of Established Methodology – The methodology that was developed by the USEPA for quantifying dermal absorption of chemicals in aqueous media was used in calculating risks following exposure to oily material due to the lack of equations/mathematical models that have been developed specifically for oily materials. The use of this approach is likely to introduce uncertainty into the estimated risk values.
- Lack of Relevant Oil Material Data – Information regarding chemical-specific concentrations in oily water is unavailable because oily water (groundwater or surface water containing slicks) was not sampled during previous investigations. To complete a quantitative evaluation of health risks potentially posed by oily material, concentration terms used in this evaluation included the analytical data of the DNAPL and chemical-specific solubility values. The use of these concentrations is expected to result in an over-estimate of risk.

These sheens are typically the lighter fraction of Site hydrocarbons, i.e. short chain alkenes, VOCs and perhaps some low molecular weight polycyclic aromatic hydrocarbons (PAHs). Since high molecular weight PAHs are too insoluble and/or are crystalline in nature they are probably not part of the sheens observed. While sheens are visually obvious, the concentrations of the hydrocarbons in a sheen are not necessarily high.

## TECHNICAL MEMORANDUM

<u>Appearance of Oil on Water</u>	<u>Estimated Hydrocarbon Concentration (mg/L)</u>
Barely visible	0.05
Silver sheen	0.1
First trace of color	0.2
Bright bands of color, iridescent	0.4
Colors tending to be dull	1.2
Colors fairly dark, rainbow tints	2.4
Brown or black	12
Brown / dark brown	120

As indicated by the above table, concentration terms used in this evaluation (DNAPL data or chemical-specific solubility) are significantly higher than estimated levels of total hydrocarbon concentrations in the 0.2 to 2.4 mg/L range, based on colors of sheens observed. Therefore, estimated risk levels represent conservative over-estimates and should not be used as the basis for deriving remedial action objectives.

The HHRA will be revised to incorporate the results of this evaluation. It is recommended that samples of oily water be collected for analyses to (1) reduce uncertainty related to potential risks estimated for oily material; and (2) generate data necessary for evaluating and selecting remedies for mitigation of oily material.

# TECHNICAL MEMORANDUM

**Table 1**  
**Summary of Risks Estimated for Oily Materials (Based on Concentrations in DNAPL)**

Table No.	Media	Title		Exposure Frequency	Results	
Attachment A - DNAPL Concentration					CR	HI
1	Groundwater	Construction Worker: Dermal Contact with Groundwater (Linear-Low Dose)	Carcinogenic	250 days/yr	<b>6.85E-03</b>	-
2		Construction Worker: Dermal Contact with Groundwater	Non-carcinogenic	250 days/yr	-	<b>5.95E+01</b>
3		Construction Worker: Dermal Contact with Groundwater (Linear-Low Dose)	Carcinogenic	1 day/yr	<b>2.74E-05</b>	-
4		Construction Worker: Dermal Contact with Groundwater	Non-carcinogenic	1 day/yr	-	<b>2.38E-01</b>
5	Surface Water	Adult Wader: Incidental Ingestion of Surface Water	Carcinogenic	12 days/yr	<b>2.63E-08</b>	-
6		Adult Wader: Incidental Ingestion of Surface Water	Non-carcinogenic	12 days/yr	-	<b>1.72E-04</b>
7a		Adult Wader: Dermal Contact with Surface Water (Linear-Low Dose)	Carcinogenic	12 days/yr	<b>4.83E-02</b>	-
7b		Adult Wader: Dermal Contact with Surface Water (One-hit Equation) <sup>(a)</sup>	Carcinogenic	12 days/yr	<b>4.77E-02</b>	-
8		Adult Wader: Dermal Contact with Surface Water	Non-carcinogenic	12 days/yr	-	<b>3.89E+00</b>
9		Adult Swimmer: Incidental Ingestion of Surface Water	Carcinogenic	12 days/yr	<b>6.58E-08</b>	-
10		Adult Swimmer: Incidental Ingestion of Surface Water	Non-carcinogenic	12 days/yr	-	<b>4.31E-04</b>
11a		Adult Swimmer: Dermal Contact with Surface Water (Linear-Low Dose)	Carcinogenic	12 days/yr	<b>9.47E-02</b>	-
11b		Adult Swimmer: Dermal Contact with Surface Water (One-hit Equation) <sup>(a)</sup>	Carcinogenic	12 days/yr	<b>9.26E-02</b>	-
12		Adult Swimmer: Dermal Contact with Surface Water	Non-carcinogenic	12 days/yr	-	<b>5.50E+00</b>

(a) The one-hit equation was used, per guidance provided in RAGS, Part A (page 8-11, USEPA, 1989) because the linear low dose equation that is typically used for estimating cancer risk is not applicable when chemical intake is high.

# TECHNICAL MEMORANDUM

**Table 2**  
**Summary of Risks Estimated for Oily Materials (Based on Solubility)**

Table No.	Pathway	Title		Exposure Frequency	Results	
<b>Attachment B - Solubility</b>					<b>CR</b>	<b>HI</b>
1	Groundwater	Construction Worker: Dermal Contact with Groundwater	Carcinogenic	250 days/yr	<b>6.42E-04</b>	-
2		Construction Worker: Dermal Contact with Groundwater	Non-carcinogenic	250 days/yr	-	<b>3104</b>
3		Construction Worker: Dermal Contact with Groundwater	Carcinogenic	1 day/yr	<b>2.57E-06</b>	-
4		Construction Worker: Dermal Contact with Groundwater	Non-carcinogenic	1 day/yr	-	<b>12</b>
5	Surface Water	Adult Wader: Incidental Ingestion of Surface Water	Carcinogenic	12 days/yr	<b>3.88E-07</b>	-
6		Adult Wader: Incidental Ingestion of Surface Water	Non-carcinogenic	12 days/yr	-	<b>0.05</b>
7		Adult Wader: Dermal Contact with Surface Water	Carcinogenic	12 days/yr	<b>2.73E-03</b>	
8		Adult Wader: Dermal Contact with Surface Water	Non-carcinogenic	12 days/yr		<b>355.92</b>
9		Adult Swimmer: Incidental Ingestion of Surface Water	Carcinogenic	12 days/yr	<b>9.69E-07</b>	-
10		Adult Swimmer: Incidental Ingestion of Surface Water	Non-carcinogenic	12 days/yr	-	<b>0.1</b>
11		Adult Swimmer: Dermal Contact with Surface Water	Carcinogenic	12 days/yr	<b>4.11E-03</b>	-
12		Adult Swimmer: Dermal Contact with Surface Water	Non-carcinogenic	12 days/yr	-	<b>682.3</b>